



STATE TAX COMMISSION OF MISSOURI ASSESSOR MANUAL

CHAPTER:

AG LAND VALUATION

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7.3 AG LAND VALUATION

The purpose of this section of the Assessor's Manual is to supplement the State Tax Commission's published rules on the grading of agricultural and horticultural land; and to assist the appraiser/assessor in correctly classifying agricultural and horticultural land into one of the eight grades published by the State Tax Commission.

The classing of soils into the appropriate grades as described in the published rules needs additional explanation in order to provide a better interpretation of the State Tax Commission's intent in grading soils statewide. Some variation will naturally occur between individual interpretations of any written guidelines. The following information should be used to assist in the grading of soil with the goal of equal assessments statewide and to hold to a minimum the difference in the interpretation of the soil grades.

The balance of this material is divided into two (2) sections.

Section I contains supplemental information that addresses soil characteristics and other factors that affect the grading of agricultural and horticultural land. In the grading of land, we must evaluate the soil because the characteristics of a soil determine its potential use and identifies its limitations. Careful examination and evaluation of soil characteristics is necessary to decide how the soil will respond and what its strong or weak points are for a particular use. Many characteristics should be considered while grading soils by the State Tax Commission guidelines.

No one characteristic (slope, color, texture, type, etc.) can be the determining factor in placing land into one of the State Tax Commission land grades. All relevant characteristics of a given soil should be considered in order to determine the correct State Tax Commission soil grade.

Section II contains the definitions of the eight (8) agricultural and horticultural land grades that were published by the State Tax Commission.

A "Glossary of Terms" relating to agricultural and horticultural land is contained in the Appendix Section of this manual. The glossary contains terms that are generally used or encountered in literature about soils and their classification. Where applicable, the effects on soil capabilities are also identified.

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SECTION I

SUPPLEMENTAL LAND GRADING INFORMATION

1. Soil Characteristics

A. Land Features

Generally land falls into one of three positions.

- Upland** - These are higher elevations not affected by streams and rivers. Upland soils have a wide variety of slopes, textures and soil types.

- Second bottom or terrace** - These originated as deposits from streams or rivers that are now not generally subject to overflow.

- Flood plains or bottom land** - These are lands that are adjacent to rivers and streams. Periodically they tend to flood when no man made restrictions such as dams and/or levees are present. Frequency, duration and time of year help determine whether flooding is damaging or not.

B. Slopes

Generally, slope is measured in percentage ranges. Following is a description of the various slopes.

- 0-2% - Land in this range is nearly level with very little runoff of surface water and minimal erosion problems.

- 2-5% - Generally slopes of this range allow surface water to be removed from the soil thereby eliminating ponding and standing water problems. Some conservation practices may be needed if erosion is a possibility.

- 5-9% - Lands in this range generally require some soil conservation practices if extensively row cropped. Conservation tillage, terraces with grassed waterways or tile outlets should be used to limit erosion.

- 9-14% - Usually lands in this range are highly erodible. Rapid water runoff on steeper slopes

increases the erosion hazard. Highly erodible soils should have increased use of small grain and grassland to assist in limiting the loss of topsoil. However, some areas have such deep soils that are so highly productive that row cropping can be accomplished even on these slopes. Depth will not prevent severe erosion and sediment from moving off the surface layer.

14-20% - Typically lands in this range are not used for cropland, but can be used for pasture and hay use if open.

20%++ - Primary use is for woods and limited pasture. If used as pasture, overgrazing can be a major erosion hazard.

C. Erosion

Erosion can be defined as the wearing of the land surface by wind or water. Two types are present in Missouri. Sheet erosion is the removal of a fairly uniform layer of soil from the land; and gully erosion is where water in narrow channels removes soil to a depth greater than sheet erosion usually from one foot to several feet in the same area. Some contributing conditions to erosion are slope, soil texture and cover. Flooding may cause scouring or damaging deposition.

D. Flooding

When determining the effects of flooding on grading, the State Tax Commission's published definition of flooding should be used; however, the word "damaging" should be closely monitored. Example: Flooding occurring before or after the growing season could be a benefit to the soil by depositing additional sediment to the existing soil. Damaging flooding causes a direct loss of capability that is sufficient enough to affect yields and profitability. Yield loss must be great enough over a 10 year period to affect the soil's income producing capability.

E. Productivity

Soils differ in their ability to produce. Some soils are best suited for soybeans, others corn, and still others wheat and grains. Crop production information from local, knowledgeable and reliable sources should be considered when contemplating the correct grades for agricultural and horticultural

land. Corn, beans, wheat, hay, cotton, rice, livestock and any other revenue producing capability directly attributable to the soil should be considered when grading the land.

F. Climate and Moisture Availability during the Cropping Season

Missouri is a large land mass and the climate varies from area to area. Consideration should be given to average annual rainfall, temperature and length of growing season when classifying soils into one of the eight land grades. It could be possible for the same soil to fall into more than one grade because of the wide range of climatic conditions in the state.

G. Color of Soil

The color of the surface (plow) layer, generally accepted to be the top seven (7) inches, indicates the organic matter content and, to a limited extent, reflects inherent soil fertility. Soils with high organic matter content are usually dark in color and are best suited for row crops. Conversely, those soils with low organic matter will be light colored at the surface layer and generally are less favorable for cultivation. Typically, soils range from dark brown to black on the high side in organic matter to red and pale yellow on the low side of organic matter. These colors range in the soil surface layer from thin (less than 3 inches) to thick (greater than 12 inches). Variations will occur in color in different geographic areas of the state.

H. Texture

The texture of the plow layer refers to the proportions of soil particles (sand, silt and clay) in that layer. Texture affects aeration, erosion, ease of tillage, moisture availability and water holding capacity. Generally, texture is described as a combination of the different particle sizes. A sandy soil feels gritty and will not stick together when wet. It has a low available water capacity. A silty soil is smooth, will not form a ball when pressed in the hand and has high available water capacity. A clayey soil forms a slick ball when pressed and is high in water holding capacity but provides low availability to the plants. A loamy soil, with a combination of particle sizes, clings together but has small cracks when pressed, has rough surfaces, some sand is evident when compacted between the fingers and is moderate in water holding capacity. Flagstones, cobbles and gravel are coarse fragments, from 2mm to 10 inches in size, and do not absorb water. As the percentage of rock or

stone increases, the soil productive capability decreases.

An example of commonly defined soil textures found in soil surveys are silt loam, fine sandy loam, silty clay loam, gravelly silt loam, flaggy silty clay loam, clay, sandy clay and others.

I. Subsoil Characteristics

The type and depth of the subsoil can directly affect the production capability of the soil. Fragipans, claypans, rocky, gravelly and bedrock all affect productivity. (See the glossary of terms in the Appendix Section for the definition of these terms.)

J. Soil types (Phases of Series)

A listing of soils in the state is available from the Soil Conservation Service. The characteristics of these soils should be examined to determine what capability is inherent in each soil type. Area of the state, climate and all other listed properties of the soils should be weighed in determining the proper grade.

K. Other Factors

One of the soil's vital functions is to serve as the natural medium for the growth of plants. This capacity varies among soils having different productive capabilities and each can be varied by land management practices. The effects of land management must be taken into account. Management, for our use in land classification, should be based upon those practices that the average prudent farmer would use to achieve the land's highest return to be gained from the investment in time, labor and resources.

2. Soil Survey

A majority of the counties in the state either have a published soil survey, a survey that is completed and waiting for publication or one that is presently being surveyed with an estimated completion date. Generally data is available at county Soil Conservation Service offices for areas not published at the present time and should be utilized as a resource of available information that can assist in soil

classification. Generally counties along the Mississippi River, the western counties in Missouri and all counties north of the Missouri River have either a published survey or the mapping has been completed but the soil survey is in the process of being published. A check at the Soil Conservation Service's office in the county will be most beneficial when seeking soil data.

Soil surveys should be used only as another tool that's available to assist the appraiser in grading land, not as a conversion to one of the State Tax Commission grades. Major differences exist in the eight capability units described in soil surveys and the eight soil grades distributed by the State Tax Commission. Direct conversion should be avoided. On-site inspection, used in conjunction with available soil survey data, should be the basis for soil classification.

3. Productivity Index Rating (PI)

The Productivity Index (P.I.) provides a scientific basis for comparing one soil with another soil. These P.I.'s should remain constant over a period of years while overall yields may increase. For our use, we will use the Production Index system developed by Ival D. Persinger, who was a Soil Scientist for the Soil Conservation Service, Columbia, Missouri. This system has been revised and updated by the Soil Conservation Service to consider current technology and trends. More detailed information about this method can be obtained at local Soil Conservation offices statewide.

Calculation of P.I.'s involve indexing soils and assigning a value (zero or minus) to each subdivision of the soil property or factor. These details will not be explained here; but contact with local Soil Conservation Service offices will yield information as to the calculation of P.I.'s. An individual P.I. rating for a soil mapping unit reflects the integrated effect of numerous factors that influence the yield potential.

The six soil properties considered for the P.I. system are: (1) Nutrient supplying power, (2) Depth of root penetration, (3) Natural soil drainage, (4) Soil texture, (5) Flooding and ponding, and (6) Slope and erosion.

These P.I.'s can also be used as another tool to assist the appraiser/assessor in selecting the appropriate land grade for agricultural and horticultural lands.

4. Conclusion

These listed soil characteristics, as explained above, are considerations that we, as appraisers, should address when classifying soils statewide. If these considerations are incorporated into land grading practices without regard to county lines, our goal of statewide equalization can be an achievable accomplishment.

At a minimum, the following soil characteristics should be addressed when grading agricultural and horticultural land. This is not to imply that these are the only features to be considered. Other relevant characteristics should be commented on as appropriate.

(1) Land features (position)

- Upland

- Second Bottom or Terrace

- Bottom Land

(a) If bottom land, comment on flooding

- Frequent damaging flooding

- Occasional damaging flooding

- Occasional or frequent flooding but not damaging to productivity due to time of year flooding normally occurs or the brief duration of the flood conditions

- Protected

(2) Percent of slope

(3) Current use/Potential use

- Row crops (Corn, Soybeans, Milo, etc.)

- Small grain crops (Wheat, Oats, Barley, etc.)

- Hay/Pasture land (Alfalfa, Clover, Orchard grass, Fescue, etc.)

(a) If hay/pasture land, comment if soil could be used for row crops or small grain crops

(4) Top soil depth and textural class (silt loam, silty clay loam, fine sandy loam, etc.)

(5) Color of soil and appraiser's opinion of organic matter content and natural fertility of soil

(6) Erosion problems - past and potential; and what soil conservation practices are currently in effect or needed

(7) Natural drainage (use one of the seven recognized classes)

(8) Available water capacity (Very low, Low, Moderate, High, Very high)

(9) Rock, Chert or Gravel in surface layer

(10) If information is available, comment on subsoil characteristics. Especially important are comments on depth to underlying pans (fragipan, claypan, etc.) or depth to bedrock.

(11) Average crop yields if obtained from knowledgeable and reliable sources

A sample Soil Evaluation Checklist is included in this section. This form can be used by the appraiser to identify the characteristics of soils within his/her county.

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SOIL EVALUATION CHECKLIST

COUNTY NO. _____ SAMPLE NO. _____	SOIL GRADES			
	GRADE _____	GRADE _____	GRADE _____	GRADE _____
1. POSITION:				
a. Flooding				
b. Frequency				
2. PERCENT SLOPE:				
3. CURRENT USE:				
4. POTENTIAL USE:				
5. TOPSOIL DEPTH:				
6. TEXTURE OF SURFACE LAYER:				
7. SOIL COLOR:				
8. ORGANIC MATTER CONTENT:				
9. NATURAL FERTILITY:				
10. CURRENT EROSION EROSION:				
11. POTENTIAL EROSION HAZARD:				
12. NATURAL DRAINAGE:				
13. SURFACE WATER RUNOFF				
14. AVAILABLE MOISTURE CAPACITY:				
15. STONE/CHERT IN SURFACE LAYER:				
16. SUBSOIL CHARACTERISTICS				
17. ROOT ZONE RESTRICTIONS ABOVE 60" (TYPE):				
a. Depth to Restriction:				

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b. Thickness of Restriction:				
18. AVERAGE CROP YIELDS:				
A. Source for Crop Yields:				

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SECTION II

AGRICULTURAL LAND GRADE DEFINITIONS

1. Agricultural/Horticultural Land Grades

The following are definitions of the agricultural and horticultural eight (8) grades as published by the State Tax Commission.

A. GRADE 1

This is prime agricultural land. The condition of the soils is highly favorable with no limitations that restrict their use. Soils are deep, nearly level (zero to two percent (0-2%) slope), or gently sloping with low erosion hazard and not subject to damaging overflow. Soils that are consistently wet and poorly drained are not placed in Grade 1. They are easily worked and produce dependable crop yields with ordinary management practices to maintain productivity - both soil fertility and soil structure. They are adapted to a wide variety of crops and suited for intensive cropping.

PI Range: 93-100 ***

B. GRADE 2

These soils are less desirable in one (1) or more respects than Grade 1 and require careful soil management, including some conservation practices on uplands to prevent deterioration. This grade has a wide range of soils and minimum slopes (mostly zero to five percent (0-5%)) that result in less choice of either crops or management practices. Primarily bottomland and best upland soils.

Limitations:

1. Low to moderate susceptibility to erosion;
2. Rare damaging overflows (once in five to ten (5-10) years); and
3. Wetness correctable by drainage.

PI Range: 86-92 ***

C. GRADE 3

Soils have more restrictions than Grade 2. They require good management for best results. Conservation practices are generally more difficult to apply and maintain. Primarily good upland and some bottomland with medium productivity.

Limitations:

1. Gentle slope (two to seven percent (2-7%));
2. Moderate susceptibility to erosion;
3. Occasional damaging overflow (once in three to five (3-5) years) of Grades 1 and 2 bottomland; and
4. Some bottomland soils have slow permeability and/or poor drainage.

PI Range: 76-85 ***

D. GRADE 4

Soils have moderate limitations to cropping that generally require good conservation practices. Crop rotation normally includes some small grain (for example, wheat or oats) and/or hay. Soils have moderately rolling slopes and show evidence of serious erosion.

Limitations:

1. Moderate slope (four to ten percent (4-10%));
2. Grade 1 bottomland subject to frequent damaging flooding (more often than once in two (2) years), or Grades 2 and 3 bottomland subject to occasional damaging flooding (once every three to five (3-5) years);
3. Poor drainage in some cases; and
4. Shallow soils, possibly with claypan or hardpan.

PI Range: 66-75 ***

E. GRADE 5

Soils are not suited to continuous cultivation. Crop rotations contain increasing proportions of small grain (for example, wheat or oats) and/or hay. Upland soils have moderate to steep slopes and require conservation practices.

Limitations:

1. Moderate to steep slopes (eight to twenty percent (8-20%));
2. Grades 2 and 3 bottomland subject to frequent damaging flooding (more than once in two

(2) years) and Grade 4 bottomland subject to occasional damaging flooding; and

3. Serious drainage problems for some soils.

PI Range: 56-65 ***

F. GRADE 6

Soils are generally unsuited for cultivation and are limited largely to pasture and sparse woodland.

Limitations:

1. Moderate to steep slopes (eight to twenty percent (8-20%));
2. Severe erosion hazards present;
3. Grades 3 and 4 bottomland subject to frequent damaging flooding (more than once in two (2) years), and Grade 5 bottomland subject to occasional damaging flooding (once every three to five (3-5) years); and
4. Requires intensive management for crops.

PI Range: 40-55 ***

G. GRADE 7

These soils are generally unsuited for cultivation and may have other severe limitations for grazing and forestry that cannot be corrected.

Limitation:

1. Very steep slopes (over fifteen percent (15%));
2. Severe erosion potential;
3. Grades 5 and 6 bottomland subject to frequent damaging flooding (more than once in two (2) years);
4. Requires intensive management to achieve grass or timber production; and
5. Very shallow topsoil.

PI Range: 15-39 ***

H. GRADE 8

Land capable of only limited production of plant growth. It may be extremely dry, rough, steep, stony, sandy, wet or severely eroded. Includes rivers, running branches, dry creek and swamp areas. Such lands do provide areas of benefit for wildlife or recreational purposes.

PI Range: 0-14 ***

*** Productivity Index is one of many factors utilized to determine soil grade. **No direct PI conversion chart shall be used.**

I. Definitions

The following are definitions of flooding:

(1) Occasional damaging flooding

Flooding of bottomland that is so infrequent that producing normal row crops is not compromised in most years.

(2) Frequent damaging flooding

Flooding of bottomlands that is so frequent that normal row cropping is affected (reduces row crop selection).

(3) Damaging flooding

A damaging flood is one that limits or affects crop production in one or more of the following ways:

- Erosion of the soil;
- Reduced yields due to plant damage caused by standing or flowing water;
- Reduced crop selection due to extended delays in planting and harvesting; and
- Soil damage caused by sand and rock being deposited on the land by flood waters.

2. Forest Land and Horticultural Land

The following prescribes special rules as to the treatment of forest land and horticultural land.

A. Adjustment for Forest/Woodlands

Forest land, whose cover is predominantly trees and other woody vegetation, should not be assigned to a land classification grade based on its productivity for agricultural crops. Forest land of two or more acres in area, which if cleared and used for agricultural crops, would fall into land grades 1 through 5 should be placed in land grade 6; or if such land would fall into land grades 6 or 7, it should be placed in land grade 7. Forest land may or may not be in use for timber production, wildlife management, hunting, other outdoor recreation, or similar uses.

B. Horticultural Use

Land utilized for the production of horticultural crops should be assigned to a land classification grade based on the productivity of the land as if used for agricultural crops. Horticultural crops include fruits, ornamental trees and shrubs, flowers, vegetables, nuts, Christmas trees and similar crops which are produced in orchards, nurseries, gardens or cleared fields.

C. Other Additional Information

(1) Levees

If the levee is restricted, such as a United States Crop of Engineers levee along the Mississippi, they are grade 7 because they have restricted use. These generally have sand cores. If the levee is a private levee that does not have restrictions, it is grade 6 because it could have hay taken off or cattle grazing on it.

(2) Man made ponds/lakes/sink holes

Ponds, lakes, etc. should be graded in accordance with the land around it.

(3) Land Subject to Conservation Easement

This is land that is subject to a U.S. Fish and Wildlife conservation easement and is restricted in its use. Under the easement restrictions, the land cannot be used to produce any agricultural or horticultural product and may only be used for hunting purposes.

Section 137.016.3 states that all real property which is vacant, unused, or held for future use for which the determination as to its classification cannot be made under the definition set out in subsection 1 of that section, shall be classified according to its immediate most suitable economic use. In determining its immediate most suitable economic use, the subsection lists eight (8) points to consider: (1) immediate prior use, (2) location, (3) zoning classification, (4) other legal restriction on use, (5) availability of public services, (6) size, (7) access to public thoroughfares, and (8) any other relevant factors. If the immediate use prior to establishment of the conservation easement was agricultural, then the land subject to the easement can be classified and treated as agricultural property.

Section 137.017.4 states that property which is classified as agricultural and which is vacant and unused shall be assessed at twelve percent (12%) of its true value. When both the criterion of vacant and unused are met, then the assessor should assess the land subject to the conservation easement using market value as the basis of value.

If either of these two (2) criteria is not met, then the assessor should assess the land pursuant to the agricultural and horticultural land grading rules. Under this scenario, the land should be placed in grade 7 due to the restricted use.